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A SYNOPSIS OF THE BRITISH PIMPLINI, WITH NOTES ON THE SYNONYMY OF THE EUROPEAN SPECIES (HYMENOPTERA ICHNEUMONIDAE)

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(*Department of Entomology, British Museum (Natural History).*)

Manuscript received 24th April, 1941.

[Read 4th June, 1941.]

With Fifty-two Text-figures.

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Introduction.

The genus *Pimpla* as defined by Morley in his British Ichneumonidae is now more usually considered as comprising six genera. There has been much confusion with regard to the names that should be used for these genera. A proposal has been submitted to the International Commission on Zoological Nomenclature (see Stiles, 1936, *Nature* **138** : 35) that the following genera and types shall be placed on the official list of generic names, viz. :—

Pimpla F. Grav. 1804 : type *Ichneumon instigator* F. 1793.
Ephialtes Grav. 1829 : type *Ichneumon manifestator* L. 1758.
Ichneumon L. 1758 : type *Ichneumon extensorius* L. 1758.

and these generic names are accordingly here used in this sense.

The six genera into which Morley's " *Pimpla* " is divisible are :—

Pimpla Fabricius s.s.
Apechthis Förster
Delomerista Förster
Itoplectis Förster
Tromatobia Förster
Ephialtes Gravenhorst (*partim*)

It has been pointed out by Cushman and Rohwer (1920) that, of these genera, *Pimpla*, *Apechthis* and *Itoplectis* are referable to the Pimplini, the remainder to the Ephialtini. *Ephialtes* (with which this paper is concerned only in so far as Ephialtine species have been referred to " *Pimpla* " by various authors) may eventually prove divisible into a number of genera, but the characters at present used apply either to one sex or the other, and it is therefore a question of finding additional characters. The synonymy of *Ephialtes*, as defined in the key to genera later in this paper, has been given by Perkins (1940). As the work of Cushman and Rohwer mentioned above has been used considerably in the present paper it is well to stress the fact that current

European nomenclature differs from that used in America as indicated in the following table :—

European	American
Pimplini	Ephialtini
Ephialtini	Ichneumonini
Pimpla	*Ephialtes*
Ephialtes	*Ichneumon*

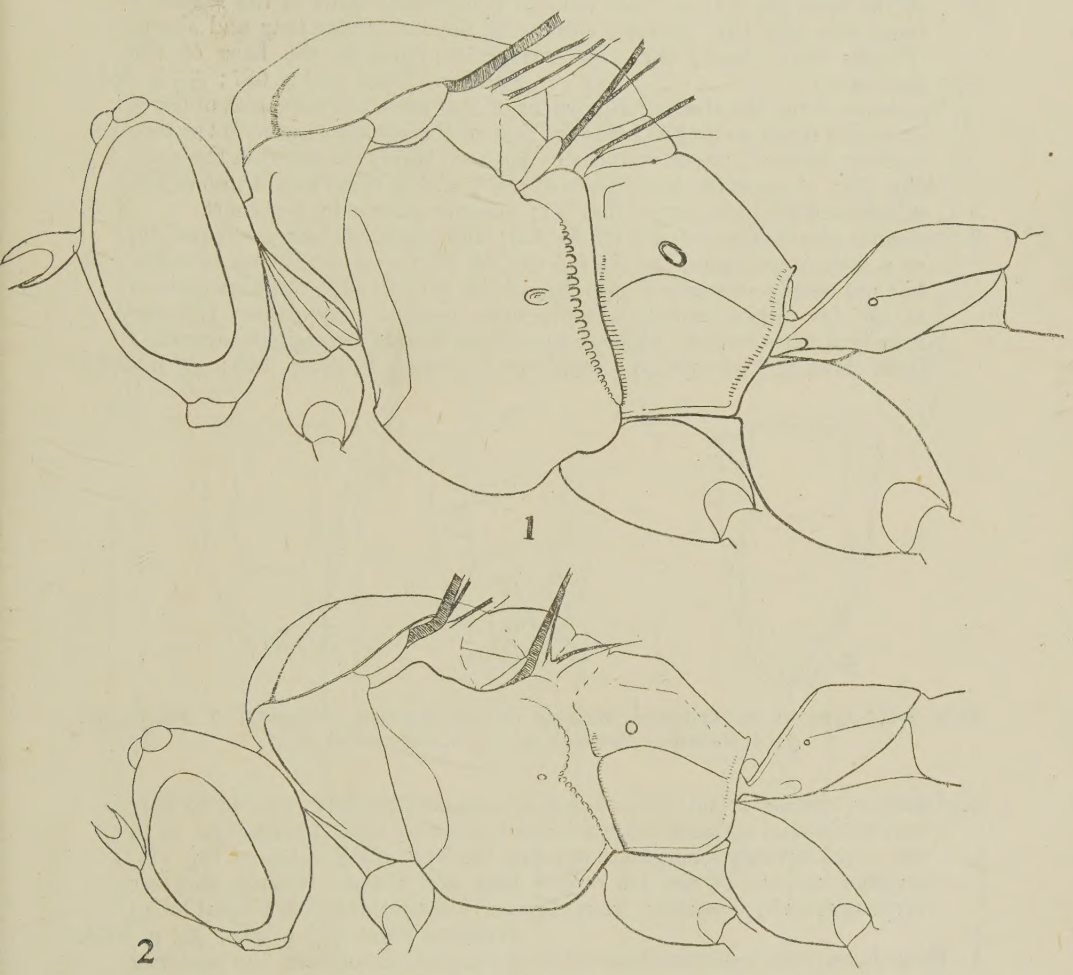
For distinguishing the species certain characters are used which have either been little used in the group or have been overlooked by recent authors. The distance between the posterior ocelli (POL) and also from a posterior ocellus to an eye (OOL) have been found to show specific characters in the Pimplini. In the Ephialtini, genera seem to show marked differences in these characters. C. G. Thomson, in his *Opuscula Entomologica*, used extensively what he termed the " epipleura " of the abdomen for separating species in almost all groups of the ICHNEUMONIDAE, but especially in his CRYPTINAE, PIMPLINAE and OPHIONINAE. This character seems not to have been understood by later writers on this group, but it is one of the most useful characters of all for separating the species of *Pimpla* of the group with the white hairs on the face. Also, it is of use in distinguishing certain genera. The epipleura in the Pimplini are the free chitinous flaps articulated with the lateral margins of the abdominal tergites, and where well developed, cover the sternites laterally. The epipleura must not be confused with the chitinous thickenings of the sternites themselves which occur in most ICHNEUMONIDAE. The figures of the abdominal segments used in this paper to show the epipleura are therefore ventral. In the PIMPLINAE these epipleura are always " inflexed " (*i.e.* they are sharply angled with the tergites) but in the OPHIONINAE, it is usually only in the second tergite that they are inflexed, and in the third tergite only inflexed at the base, but the degree of inflexion in this segment is important in the differentiation of species. (*Cf.* Thomson's divisions of *Campoplex.*)

Another character which occurs in various species throughout the ICHNEUMONIDAE, and, except in *Exenterus*, has been little used, is the form of the prepectus (the anterior area of mesopleura and mesosternum which in nearly all Ichneumonids is bounded behind by a sharp, distinct carina). It is the area that, ventrally, lies directly behind the front coxae and it is here that many unnoticed characters will be found. For example, in certain *Itoplectis*, this area is hollowed out behind the front coxae. Certain species of *Exenterus* (Cteniscini) have been separated from the rest in having a sharp carina on the prepectus, margining laterally and ventrally the very slight depression into which the front coxae fit. This character is quite easy to see in well-mounted material. In mounting ICHNEUMONIDAE it is very important to keep the legs well away from the thorax, as ventral and pleural characters of the thorax are much used; carded material is frequently impossible to determine with certainty. In other tribes this carina is also of importance, though it has been overlooked.

The carina margining the prepectus, termed the epicnemia by Thomson, also shows good specific and generic differences in certain groups.

I wish to thank Prof. Dr. Bischoff (Berlin) for obtaining many types for my examination in Berlin, Prof. Pax (Breslau) for facilities for examining the Gravenhorst types, Dr. Kemner (Lund) for facilities and much help when

examining the Thomson types, Dr. Roman (Stockholm) for facilities for examining the Holmgren types and for much valuable help, and Mr. Stelfox (Dublin) for much valuable help and information.



FIGS. 1–2.—Lateral view of the thorax: 1. *Itoplectis maculator* F. ♀; 2. *Ephialtes* (*Scambus*) *vesicarius* Ratz. ♀.

Key to the genera contained in *Pimpla* s.l.

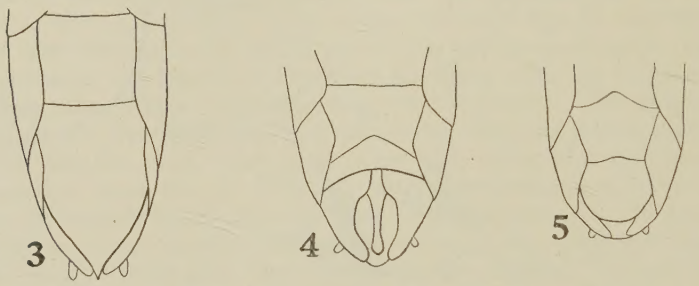
1. Mesopleural furrow not angled opposite the punctiform fovea (*cf.* fig. 1); parapsidal furrows only present anteriorly, weak (*cf.* fig. 1); ♂ with the last sternite of the abdomen long and pointed (fig. 3). (Transverse median vein of the hind-wings always broken well above the middle; internal parasites of pupae.) . . . . . Pimplini. 2.

–. Mesopleural furrow angled opposite the punctiform fovea (*cf.* fig. 2); parapsidal furrows distinct and long (fig. 2); ♂ with the last sternite usually short and truncate apically (*cf.* fig. 4), if long then rounded apically (fig. 5). (Epipleura of the abdomen always very narrow (*cf.* figs. 6 and 7). External parasites of larvae of Lepidoptera, Coleoptera, Diptera and Hymenoptera and in the egg bags of spiders.). . . . . Ephialtini (*partim*). 4.

2. Epipleura of the 5th abdominal segment of ♀ at least 3 times, and of the ♂ at least 4 times, as long as broad (figs. 8, 9 and 10); ♂ with the face conspicuously marked with yellow; ♀ with the ovipositor sharply decurved at the apex (fig. 11), at least the fore and middle claws of the ♀ with a basal lobe (fig. 13); anterior carinae of the 1st tergite long and sharp. (Cheeks very short; the eyes emarginate opposite the base of the antennae.) . . . . . *Apechthis* Först. (♀♀ p. 657; ♂♂ p. 658.)

–. Epipleura of the 5th abdominal segment of ♀ at most $2\frac{1}{4}$ times, and of the ♂ at most 3 times, as long as broad (*cf.* figs. of *Pimpla* spp.); ♂ with the face entirely black; ♀ never with the ovipositor sharply decurved at the apex (fig. 12); at most the front claws of the ♀ with a basal lobe, those of the middle and hind legs simple (fig. 14); anterior carinae long or short . . 3.

3. Antennae attenuating apically (*cf.* fig. 42); 2nd hind tarsal segment equal to, or a little longer than, the 5th (*cf.* figs. 47–48); eyes sometimes broadly, but not deeply emarginate (figs. 24, 26, 39, 40 and 41); anterior carinae of the 1st tergite usually absent, when present very short. (Cheeks usually a little longer; clypeus sometimes weakly emarginate apically; front claws of ♀ never with a basal lobe.) *Pimpla* F. (♀♀ p. 649; ♂♂ p. 652.)



Figs. 3–5.—Apex of the abdomen, showing the hypopygium (stippled): 3. *Pimpla* sp. ♂; 4. *Ephialtes* (*Scambus*) sp. ♂; 5. *Delomerista* sp. ♂.

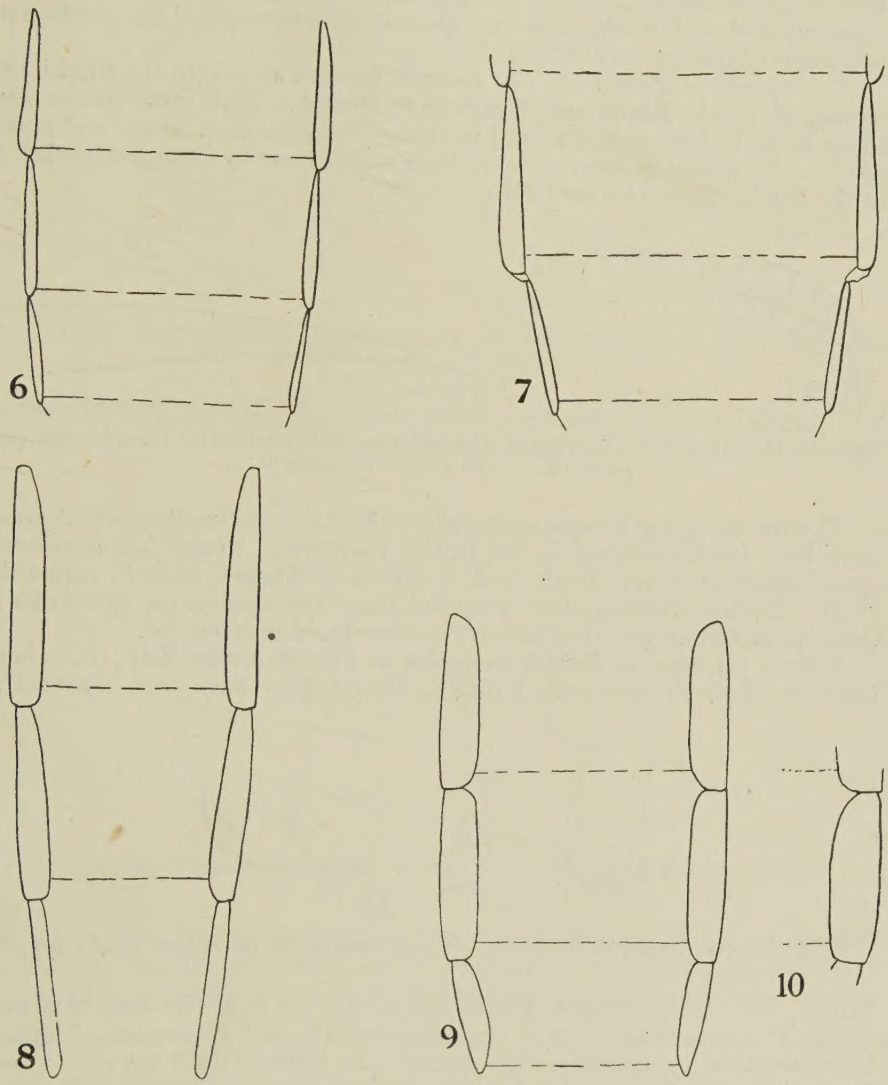
–. Antennae clavate or sub-clavate, not attenuating apically (figs. 43 to 46); 2nd hind tarsal segment always distinctly shorter than the 5th (figs. 49 to 52); eyes strongly emarginate opposite the base of the antennae (fig. 16), anterior carinae of the 1st tergite long and sharp. (Cheeks shorter; clypeus apically truncate; front claws of ♀ sometimes with a basal lobe.) *Itoplectis* Först. (♀♀ p. 655; ♂♂ p. 657).

4. Propodeum with a distinct indication of complete areolation, the posterior transverse carina always strong and complete (fig. 18); abdomen with distinctive coriaceous sculpture; ♂ with the last abdominal sternite long and broadly rounded apically (fig. 5). (Cheeks usually a little longer; occipital carina not angled centrally (*cf.* fig. 20); transverse median vein of hind-wings antefurcal; clypeus depressed centrally and excised apically; claws of ♀ never with a basal lobe. Parasites of sawfly larvae.) *Delomerista* Först.

–. Propodeum with at most an indication of two median longitudinal costae and a weak posterior transverse carina (*cf.* fig. 7); abdomen usually distinctly punctured, but if not punctured then never coriaceous; ♂ with the last sternite very short (*cf.* fig. 4). (Cheeks always very short; all the claws of ♀ usually with a basal lobe (of the British species only *Ephialtes* (*Eremotylus*) *ruficollis* Grav. without).) . . . . . 5.

5. Clypeus not depressed centrally, apically truncate or lightly broadly emarginate (fig. 21); head more strongly narrowed behind the eyes, the occipi-

tal carina not angled centrally, the occiput not excised behind the ocelli (fig. 19). (Transverse median vein of the hind-wings always postfurcal, and broken distinctly above the middle; parasites in the egg bags of spiders.) . . . . . *Tromatobia* Först.



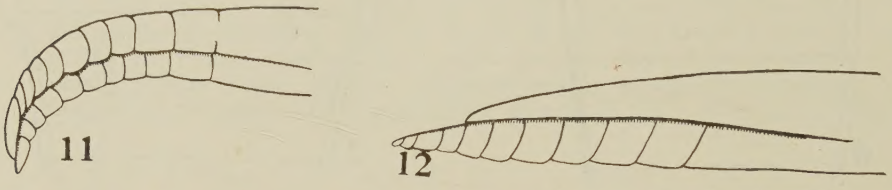
FIGS. 6–10.—Ventral view of the 4th, 5th and 6th abdominal segments showing the epipleura: 6. *Ephialtes* (*Scambus*) *brevicornis* Grav. ♂; 7. *E.* (*S.*) *brevicornis* Grav. ♀; 8. *Apechthis resinator* Thunb. ♂; 9. *A. resinator* Thunb. ♀; 10. *A. compunctor* L. ♀.

–. Clypeus depressed centrally and strongly, sharply excised apically (fig. 22); head rarely narrowing directly behind the eyes, the occipital carina angled centrally, the occiput shallowly excised behind the ocelli (fig. 20). (Transverse median vein of hind-wings frequently broken in or below the middle; external parasites of larvae.) . . . . . *Ephialtes* Grav.

Notes on the nomenclature of British Pimplini.

Only the species of Pimplini are considered in this paper. Although these include some of the commonest of the British species of ICHNEUMONIDAE, they have been greatly confused in the literature and also in collections. Much more material, and in particular bred material, will be required for an adequate treatment of the species of Ephialtini.

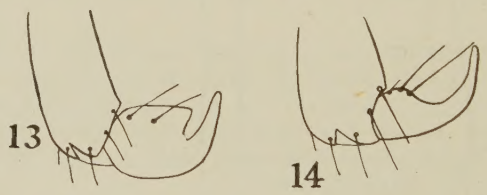
Two species of *Pimpla* are now brought forward as new to the British list, namely *P. sodalis* Ruthe and *P. geniculata* Hensch. Both these species were taken by R. B. Benson in Scotland in 1934. *P. sodalis* is an arctic and alpine species. *P. geniculata* was also taken (1 ♀) at Aviemore by Champion and (1 ♂) in the Forest of Dean by me (1936).



FIGS. 11–12.—Apex of the ovipositor (the stylets a little exserted): 11. *Apechthis compunctor* L. ♀; 12. *Pimpla instigator* F. ♀.

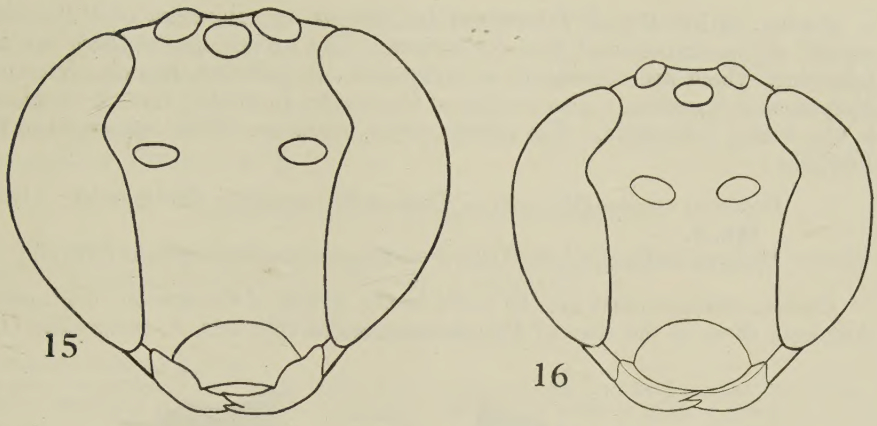
The species of the *Pimpla contemplator* (Müll.) (= *turionellae* auctt.) group have been much confused in the British literature. Morley has incorrectly synonymised *P. spuria* Grav. and *P. flavicoxis* Thoms. with *P. turionellae* auctt. Certain earlier authors recorded these two species (or synonyms of them) from Britain and they are now re-introduced into our list.

I have yet seen no British examples of *Pimpla arctica* Zett., *P. viduata* Grav. or *Itoplectis curticauda* Kriechb., though they have been recorded as



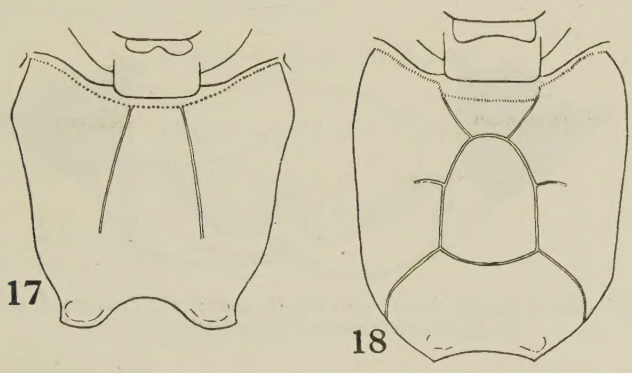
FIGS. 13–14.—Claw of pretarsus: 13. with basal lobe; 14. without basal lobe.

British. The specimens that I have seen labelled as *P. arctica* Zett. have been mostly *P. spuria* Grav., but *P. contemplator* Müll. and *P. flavicoxis* Thomson have also been determined as this species. As Stelfox (1929) has pointed out, *Itoplectis curticauda* Kriechb. is quite distinct from *I. clavicornis* Thomson, and it is this latter species which occurs in Britain. All specimens recorded as *Pimpla viduata* Grav. and so labelled seem to have been small *Pimpla instigator* F. The type of *P. viduata* Grav. was seen in Breslau, and as the synonymy of this species was unknown, it is unlikely that it has ever been correctly determined in this country, and it has therefore been excluded in dealing with the British species. It is a species of *Itoplectis*. *Itoplectis ovalis* Thomson (1877) and *Pimpla meridionalis* Kriechb. (1887) are both synonyms of *Itoplectis viduata* (Grav.) (1829). The species may be



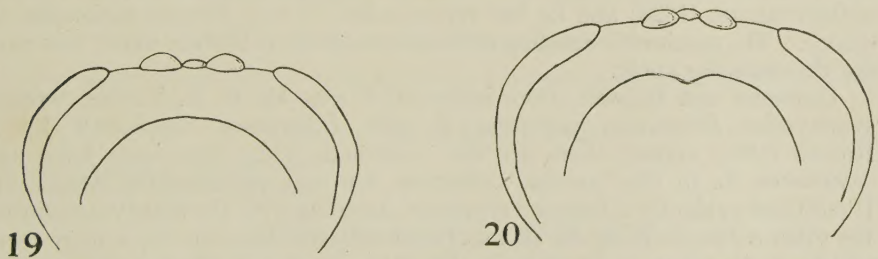
FIGS. 15–16.—Head viewed from in front: 15. *Apechthis rufata* Gmel. ♀; 16. *Itoplectis maculator* F. ♀.

readily distinguished from the others of the genus by the black abdomen, the prepectus excised behind the front coxae, the spiracles of the propodeum



FIGS. 17–18.—Propodeum, viewed dorsally: 17. *Ephialtes* (*Scambus*) sp. ♀; 18. *Delomerista* sp. ♀.

elongate and the hind tibiae being red with only a faint indication of a white ring towards the base, and also in the ♀ the claws of the front legs having basal lobes and the ovipositor being longer than the 1st abdominal segment.



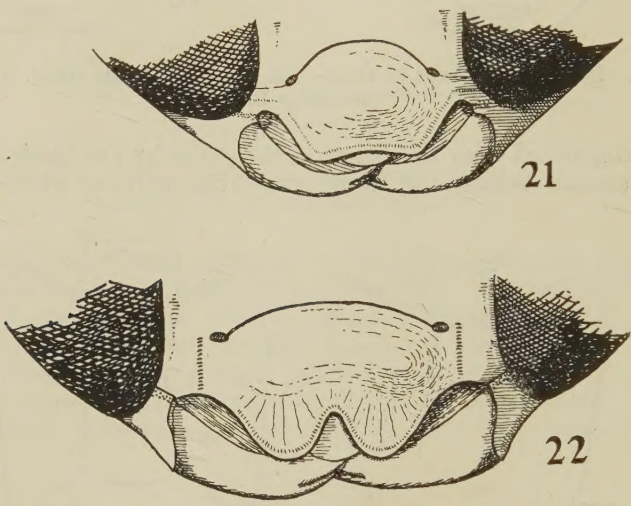
FIGS. 19–20.—Dorsal part of head, viewed from behind: 19. *Tromatobia oculatoria* F. ♀; 20. *Ephialtes* (*Iseropus*) *graminellae* Schr. ♀.

Morley, in his *British Ichneumonidae*, placed as subgenera of "*Pimpla*" certain of the names used here for genera. The exceptions to these are the following, which are considered as subgenera of *Ephialtes*, namely, *Exeristes*, *Epiurus* and *Scambus*. Also certain of the species in his key have been placed in the wrong subgenera. The species given below are those concerned in the Pimplini :—

Itoplectis epeirae (Bignell) = *Tromatobia variabilis* (Holmgren). (1854) **syn. n.**

Epiurus melanocephala (Grav.) = *Itoplectis melanocephala* (Grav.).

Certain changes must also be made in the names of the species of Pimplini. Amongst these is the case of *Pimpla examinator* (F.) and *P. turionellae* (L.).



FIGS. 21–22.—Lower part of head, showing clypeus: 21. *Tromatobia oculatoria* F. ♀; 22. *Ephialtes* (*Iseropus*) *graminellae* Schr. ♀.

Roman (1932) has shown that these names are synonymous. It is proposed to use *Pimpla contemplator* Müller for *Pimpla turionellae* auctt. (*nec* L.). The first synonym of *P. turionellae* auctt. in Dalla Torre's *Catalogue* (1901) is *Ichneumon contemplator* Müll. With regard to the use of the name *P. contemplator* (Müll.) the following notes must be given. Horn (1926) states that the Müller collection is no longer in existence. The first reviser of *I. contemplator* is Gravenhorst (1829) and he has synonymised it with *Pimpla turionellae* (L. Grav.). The specimens standing in the Gravenhorst collection under this name are *P. turionellae* auctt.

Cushman and Rohwer, from information sent by R. E. Turner, wrongly synonymise *Ichneumon instigator* F. with *Ichneumon compunctor* L. As Roman (1932) stated, there are two specimens under the name *Ichneumon compunctor* L. in the Linnean Collection, the one an *Apechthis brassicariae* (Poda) and evidently a Linnean specimen, agreeing with the scanty description, the other a *Pimpla instigator* (F.) and evidently not Linnean but a more recent addition; therefore *A. brassicariae* (Poda) is a synonym of *A. compunctor* (L.).

Under the ♂ of *Pimpla turionellae* (L.) *nec* auctt., Morley has confused the ♂

of *P. spuria* Grav. and *P. contemplator* (Müll.). The ♂ described by him as that of *P. turionellae* (= *contemplator* (Müll.)) is the ♂ of *P. flavicoxis* Thoms. *P. curticauda* Kriechb. Morley *nec* Kriechb. is *Itoplectis clavicornis* (Thomson). *Apechthis resinator* (Thunb.) has been recorded by a number of authors from Britain and is our commonest species of this genus. It was, however, not recorded by Morley (1907).

Some Synonymy of European Pimplini.

The species of which I have examined the type are marked with an asterisk (*). The British species are marked with a dagger (†).

† *Pimpla instigator* (F.) 1793.

Ichneumon instigator F. 1793.
Pimpla processioniae Ratz.* 1844. (This is the variety with the scutellum marked with yellow.)
Pimpla intermedia Holmgr.* 1860. (This is the variety with a red or yellow stigma.)

Pimpla illecebrator (Vill.) 1789.

Ichneumon illecebrator Vill. 1789.
Pimpla caligata Snell. v. V. 1877.

It is at present uncertain how the male of this species can be distinguished from that of *P. instigator* F., but the female can be told at once by the longer ovipositor and entirely black hind tibiae.

† *Pimpla aethiops* Curtis 1828.

Pimpla aterrima Grav.* 1829 **syn. n.**

Pimpla arctica Zett.* 1838.

Pimpla lapponica * Thomson 1877.

† *Pimpla sodalis* Ruthe * 1859.

Pimpla nordenskiöldi Holmgren * 1872.
Pimpla longiceps Thomson * 1877.
Pimpla nigrohirsuta Strobl. 1901.

† *Pimpla turionellae* (L.) * 1758.

Ichneumon turionellae L.* 1758.
Cryptus examinator F. 1805.
Pimpla opacellata Desv.* 1868 **syn. n.**
Pimpla padellae Torqua **syn. n.**

Pimpla turionellae var. *moraguesi* Schmied. 1888.

P. moraguesi Schmied. was described as a distinct species. It appears to be the southern European form of *P. turionellae* L. in which the hind coxae are entirely red.

† **Pimpla melanacrias** nom. n.

Pimpla geniculata Hensch 1929, *Konowia* **8**: 123 *nec Ichneumon geniculatus* Fourcroy 1785, *Ent. Paris* : 397.

† *Pimpla spuria* Grav.* 1829.

Pimpla strigipleuris Thomson * 1877.
Pimpla nilotica Schmied. 1888 **syn. n.**

† *Pimpla contemplator* (Müll.) 1776.

Ichneumon contemplator Müll. 1776.
Pimpla turionellae auctt. *nec* L.
Ichneumon geniculatus Fourcroy 1785 (*sec* Gravenhorst 1829).

† *Pimpla flavicoxis* Thomson 1877.

Pimpla turionellae var. 3 Grav. 1829.

† *Itoplectis melanocephala* (Grav.) * 1829.

Pimpla melanocephala Grav.* 1829.
Pimpla bicolor Boie 1855.
Pimpla ephippium Brullé 1846.
Pimpla cleopatra Schmied.* 1897.

Itoplectis curticauda (Kriechb.) * 1887.

Pimpla curticauda Kriechb.* 1887.

† *Itoplectis clavicornis* (Thomson) * 1877.

Pimpla clavicornis Thomson * 1877.
Pimpla curticauda Kriechb., Morley *nec* Kriechb.

† *Itoplectis alternans* (Grav.) * 1829.

Pimpla alternans Grav.* 1829.
Pimpla tricolor Ratz.* 1852 **syn. n.**
Pimpla examinanda Ratz.* 1852 **syn. n.**
Pimpla tricincta Thoms.* 1877.

† *Itoplectis alternans* var. *kolthoffi* Auriv. 1890.

Pimpla kolthoffi Auriv. 1890.

† *Itoplectis maculator* (F.) 1775.

Ichneumon maculator F. 1775.
Ichneumon scanica Vill. 1789.
Pimpla cruentata Rudow 1883 * **syn. n.**[1]

Itoplectis viduata (Grav.) * 1829 **conj. n.**

Pimpla viduata Grav.* 1829.
Pimpla ovalis Thomson 1877 * **syn. n.**
Pimpla meridionalis Kriechb.* 1887 **syn. n.**

Apechthis capulifera (Kriechb.) * 1887.

Pimpla capulifera Kriechb.* 1887.

Some doubt has been expressed as to the validity of this species. As well as the entirely black coxae, it can be distinguished in both sexes from the other European species of the genus by the more strongly punctured mesonotum, as stated by Thomson.

† *Apechthis compunctor* (L.) * 1758.

Ichneumon compunctor L.* 1758.
Ichneumon brassicariae Poda 1761.
Ichneumon varicornis F. 1804.
Pimpla rufipes Rudow 1881 * **syn. n.**
Pimpla lativentris Rudow 1881 * **syn. n.**

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[1] This is the form of *I. maculator* F. with the red lateral and apical margins of the abdominal segments more extensive. It may prove to be a distinct southern form of this species, but until more material from other parts of Europe is examined I prefer to regard it simply as a synonym of *I. maculator*. *Pimpla alternans* var. *decora* Morley (1907, *British Ichneumons* **3** : 106 footnote) is this same form and is of course not a variety of *I. alternans*, but of *I. maculator*.

† *Apechthis rufata* (Gmelin) 1790.

Ichneumon rufata Gmel. 1790.
Pimpla flavonotata Holmgr.* 1860.
Pimpla rufithorax Strobl 1901.

P. rufithorax Strobl based on a single female captured in Dalmatia is said to differ from *A. rufata* Gmel. only in having the markings of the thorax red instead of yellow. I believe it to be merely a discoloured specimen of this species.

† *Apechthis resinator* (Thunb.) 1822.

Ichneumon resinator Thunb. 1822.
Pimpla rufata var. 3 Grav.* 1829.
Pimpla quadridentata Thoms.* 1877.

Notes on the Distribution of British Pimplini.

The majority of the British species given in the above list are very common and widely distributed. The following notes deal only with the rarer species.

Pimpla aethiops Curtis.

This species was described by Curtis from material bred from the pupae of *Papilio machaon* L. and *Laelia coenosa* Hb. The species was also sent by Hope to Gravenhorst, who described it as *P. aterrima*. No recent specimens of this species appear to have been captured.

Pimpla arctica Zett.

This arctic and alpine species may be found to occur in Scotland, being of wide distribution on the continent. I have yet seen no British example.

Pimpla sodalis Ruthe.

The only British specimens of this species seen were taken by R. B. Benson in Perthshire in 1934.

Pimpla turionellae (L.).

Linnaeus described this species from a specimen bred from his *Phalaena turionella*, a species of *Evetria* the identity of which is still uncertain. Among many other hosts, this *Pimpla* is a common parasite of *E. buoliana* Schiff. Miss Dorothy Jackson (1937) has published a very interesting account of the biology of this species under the name *Pimpla examinator* (F.), a synonym of *P. turionellae* (L.).

Pimpla melanacrias Perkins.

The only specimens known to me are from Perthshire, Aviemore and Gloucestershire.

Pimpla spuria Grav.

This species is not as common as the ubiquitous *P. contemplator* (Müll.) and *flavicoxis* Thoms. Among other hosts, it parasitises the pupae of species of *Depressaria* in the stems of Umbelliferae. Those pupae which are found in the stems in the autumn and have not produced moths, usually produce this parasite in the following year.

Itoplectis clavicornis (Thoms.).

This seems to be a very rare species. Bignell caught 2 males at Plymbridge, Devon, and Stelfox (1929) records the species from *Phobocampa confusa* Thoms. on *Vanessa io* and from *Macrocentrus abdominalis* (F.) from Co. Wicklow.

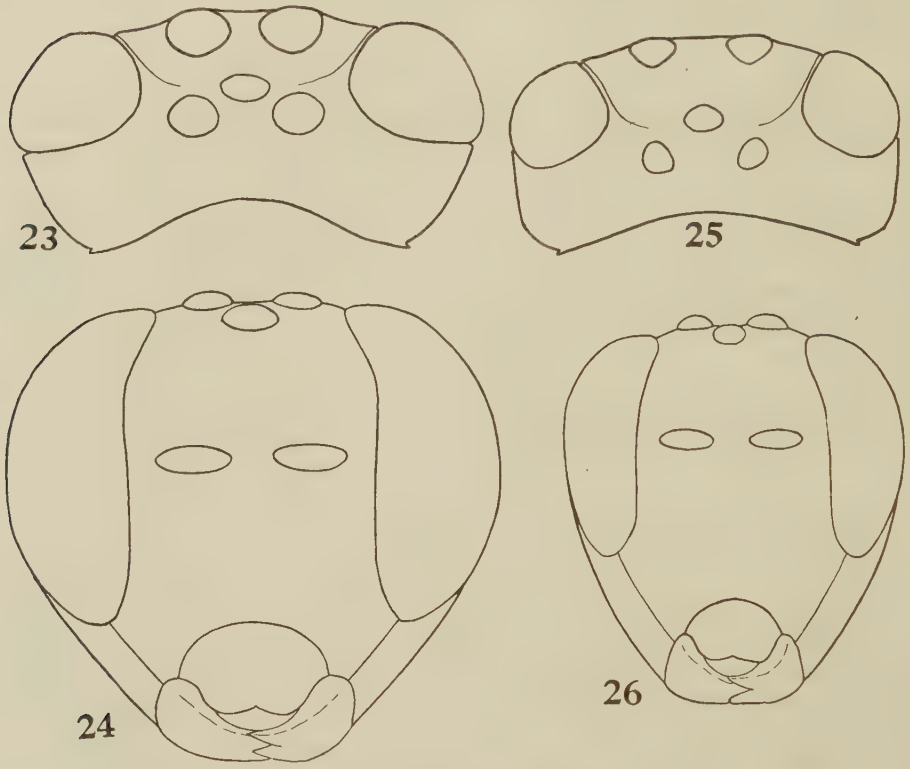
Itoplectis curticauda (Kriechb.).

In Britain, this has been confused with the previous species and no specimens of it have been seen from this country. It is, however, included in the key.

Itoplectis melanocephala (Grav.).

This species is very rare in Britain. Specimens have been seen from Dorset (Haines), and there is a single specimen in the Desvignes collection.

The remaining species seem to have been captured in all localities in which any extensive collecting of this group has been carried out.



Figs. 23–26.—Head viewed from above and from in front: 23 & 24. *Pimpla arctica* Zett. ♀; 25 & 26. *P. sodalis* Ruthe ♀.

Only one British species of this tribe is known to hibernate as an adult, and then only the female. This is *Itoplectis maculator* F., which is one of the most abundant species of the group.

Keys to the species of British Pimplini.

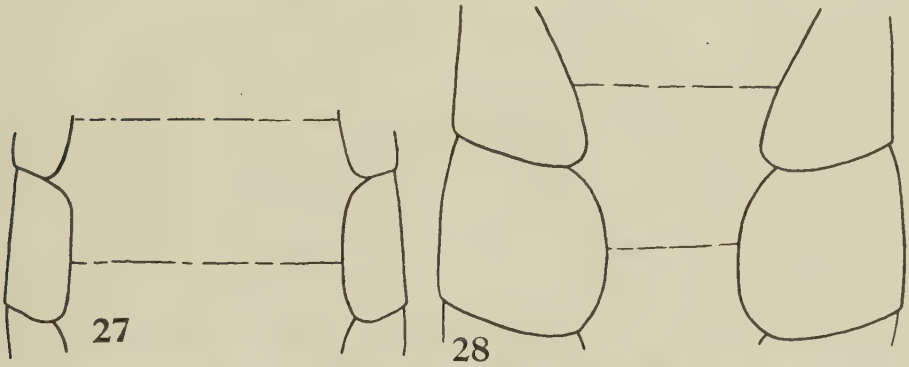
Sexual dimorphism is considerable in the Pimplini, and has led to much confusion. For this reason, separate keys are given for males and females as this simplifies determination.

Individuals vary very greatly in size and hence no lengths have been included in the following keys. For the approximate average size of the species see Morley and Schmiedeknecht.

Keys to the species of *Pimpla*.

Females.

1. Hair on the face black, hair on the propodeum usually black, if pale then the cheeks unusually elongate (*cf.* fig. 26) . . . . . 2.
–. Hair on the face and thorax pale . . . . . 5.
2. Mesopleura centrally closely punctured (the distance between the punctures at most equal to the diameter of the punctures) . . . . . 3.
–. Mesopleura centrally more sparsely punctured (the distance between the punctures about twice the diameter of the punctures) . . . . . 4.
3. Scutellum shining, with coarse sparse punctures; legs bright red with only the coxae, trochanters and hind tarsi black; general sculpture distinctly coarser.
   (Black; the legs red with the coxae and trochanters black, but the hind trochantelli sometimes red apically, the hind tarsi dark brown or black; stigma usually black, sometimes red or yellow) . . . *instigator* (Fab.).



FIGS. 27–28.—Ventral view of the 4th abdominal segment showing the epipleura: 27. *Pimpla flavicoxis* Thoms. ♀; 28. *P. melanacrias* nom. n. ♀.

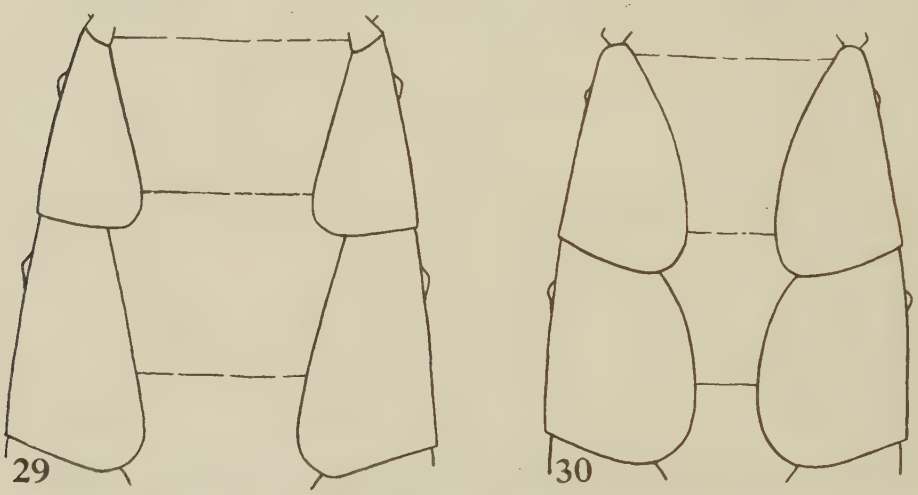
–. Scutellum dull, closely punctured; legs black with only the front legs sometimes sparingly marked with yellow and the middle knees sometimes yellow; general puncturation rather fine . . . . . *aethiops* Curtis.[2]
4. Temples narrowed (fig. 23); cheeks short (fig. 24); hind coxae red.
   (Black; legs red with the fore and middle coxae and trochanters black, the hind trochanters black beneath at the base, the hind tibiae usually entirely black, sometimes red banded towards the base and in rare varieties entirely red, the hind tarsi black) . . . . . *arctica* Zett.

[2] This species, which does not seem to have been recognised on the continent, differs from *P. instigator* not only in colour but also in structure. In addition to the characters given in the key, *P. aethiops* differs from *P. instigator* as follows: the pronotum is strongly and closely punctured; the mesonotum is very much more finely and closely punctured; the mesopleura are more closely punctured; the metapleura of the female are more rugose; the coxae are very closely and conspicuously punctured beneath, and in both sexes the hind coxae are dorsally, apically, transversely striate; the propodeum is more finely rugose; the abdomen is more finely punctured and the pubescence is more dense; the epipleura of the two species are similar, that of the 4th segment conspicuously broader than the 3rd.

It should be remembered that in this species the hair on the head and thorax is black. This character alone will separate it at once from the dark varieties of *turionellae* L. (*nec* auctt.) and of a new species (*aterrima* var. 1 Grav.) with which it has been confused.

–. Temples broad (fig. 25); cheeks very long (fig. 26); all the coxae black.
(Black; legs red with the coxae and trochanters black, the hind tibiae usually in part or wholly black and the hind tarsi brown or black)
sodalis Ruthe.[3]

5. Mesopleura strongly punctured, the distance between the punctures about equal to the diameter of the punctures; mesonotum strongly punctured; usually with a yellow line in the hind angle of the pronotum; POL : OOL = 2 : 1; cheeks shorter, $\frac{1}{2}$ as long as the breadth of the clypeus.
(Black; pronotum usually with a yellow dash in the hind angle, tegulae usually yellow but sometimes brown or black; all the coxae and trochanters black, the remainder of the fore and middle legs red marked with fuscous, the middle tibiae usually with a pale band, hind legs black with the femora most usually red basally or centrally and the tibiae usually with a white band towards the base; ovipositor as long as the first 3 abdominal segments) . . . . . *turionellae* (L.) (*nec* auctt.).



Figs. 29–30.—Ventral view of the 2nd and 3rd abdominal segments showing the epipleura: 29. *Pimpla melanacrias* nom. n. ♀; 30. *P. contemplator* Müll. ♀.

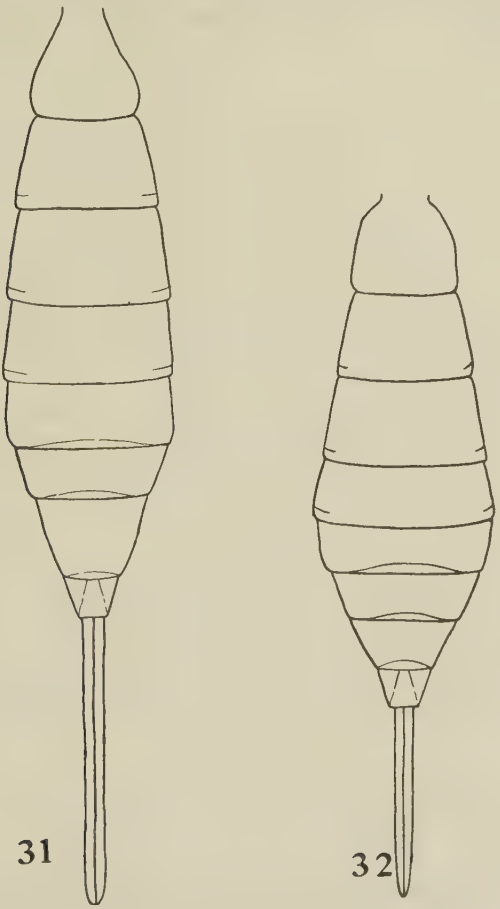
–. Mesopleura with remote and fine punctures; punctures of the mesonotum fine and very shallow; never with a yellow line in the hind angles of the pronotum; POL : OOL at most 1·5 : 1; cheeks longer, at least $\frac{3}{4}$ as long as the breadth of the clypeus . . . . . 6.

6. Epipleura of the abdomen narrow, of the 4th segment about $2\frac{1}{4}$ times as long as broad (fig. 27); abdomen with strong microscopic sculpture between the punctures; apical margins of the abdominal segments dull; propodeum with no central area.
(Black; the tegulae usually yellow, rarely testaceous or black, scutellum sometimes marked with yellow; legs red and fore coxae sometimes black, the middle tibiae sometimes with a pale ring towards the base, the hind femora narrowly but usually distinctly black apically, the hind tibiae black or testaceous with a white ring, and the hind tarsi fuscous or black; ovipositor a little longer than the first two abdominal segments)
flavicoxis Thomson.

[3] The Scotch form of this species can be distinguished at once from the continental. The hair on the propodeum is white, whereas in the continental forms seen by me it is black.

–. Epipleura of the abdomen very broad, of the 4th segment about as long as broad (*cf.* fig. 28); abdomen little sculptured between the punctures and the apical margins of the segments smooth and shining; propodeum with a central area . . . . . 7.

7. Hind femora distinctly black apically; face very sparsely punctured; epipleura of the 2nd abdominal segment distinctly narrower (fig. 29).
(Black; the legs red, the fore coxae and trochanters usually black, the middle tibiae usually with a pale ring towards the base, the hind femora con-



Figs. 31–32.—Dorsal view of abdomen: 31. *Pimpla spuria* Grav. ♀; 32. *P. contemplator* Müll. ♀.

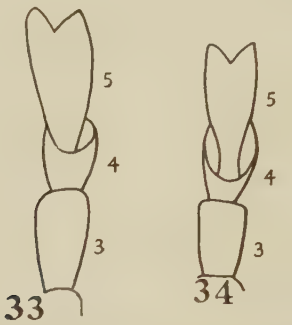
spicuously black apically, the hind tibiae with a white ring towards the base and the hind tarsi black; ovipositor as long as the first three abdominal segments together) . . . . . *melanacrias* nom. n.

–. Hind femora entirely red; face strongly and more closely punctured; epipleura of the second abdominal segment broader (*cf.* fig. 30) . . . 8.

8. Ovipositor as long as the first three abdominal segments together (fig. 31); the 4th segment of the fore tarsus, viewed dorsally, about as long as broad (fig. 33); hind tibiae with a red or deep yellow band.
(Black; the legs red; the front coxae and trochanters usually black, the

hind tibiae usually black with a red or deep yellow ring, but varying to red in the basal half and fuscous apically or more rarely entirely red, the hind tarsus fuscous or black) . . . . . *spuria* Grav.

–. Ovipositor as long as the first two abdominal segments together (fig. 32); the 4th segment of the fore tarsus viewed dorsally strongly excised apically and only $\frac{1}{2}$ as long as broad (fig. 34); hind tibiae with a white band.
(Black; the legs red with the fore coxae and trochanters most usually, and the middle sometimes black, rarely with the hind coxae black marked, the middle tibiae sometimes with a pale ring towards the base, the hind tibiae fuscous or black with a white ring towards the base and the hind tarsi fuscous or black) . . . . . *contemplator* (Müll.).



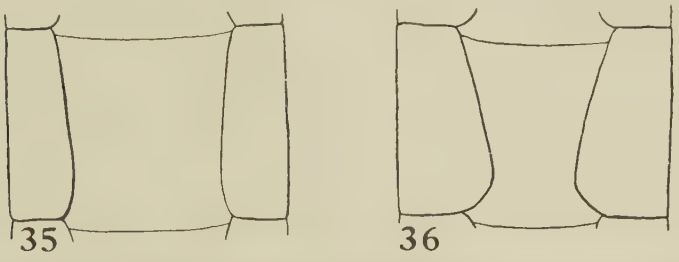
Figs. 33–34.—3rd, 4th and 5th front tarsal segments: 33. *Pimpla spuria* Grav. ♀; 34. *P. contemplator* Müll. ♀.

Males.

1. Hair on the face black. (Epipleura of abdomen narrow, of the 3rd segment about three times as long as broad) . . . . . 2.
–. Hair on the face white, rarely somewhat sordid . . . . . 5.
2. Flagellum with at least segments 6–9 with a longitudinal raised line. (Cheek measured along the genal line about $\frac{2}{3}$ as long as the width of the base of the mandible) . . . . . 3.
–. Flagellum with no raised line . . . . . 4.
3. Black, the legs red except for the black coxae, trochanters and hind tarsi. (Punctures usually distinctly coarse; tegulae usually yellow; scutellum occasionally yellow or marked with yellow; hind tibiae rarely black apically, or entirely black [4]:—var. *meridionalis* Seyrig) . *instigator* (Fab.).
–. An almost entirely black species, with only the fore and middle legs somewhat obscurely marked with yellow; tegulae usually yellow. (Punctures finer) . . . . . *aethiops* Curtis.
4. Head with temples unusually broad (*cf.* fig. 25); 1st tergite with no distinct raised central area; coxae entirely black.
(Black; the legs red, with the coxae and trochanters, the apical half of the hind tibiae and the hind tarsi black) . . . . . *sodalis* Ruthe.
–. Head with the temples normal (*cf.* fig. 23); 1st tergite with a distinct raised central area; hind coxae most usually partly red.
(Black; the legs red with the fore and middle coxae and trochanters black, the hind coxae and trochanters marked with black, the hind tibiae black, occasionally red towards the base, and the hind tarsi black) . *arctica* Zett.

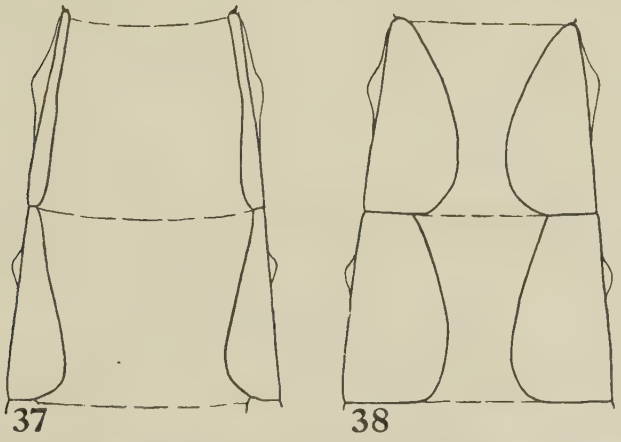
[4] I have seen no specimen with entirely black hind tibiae from Britain.

5. POL : OOL = 2 : 1; mesonotum strongly and closely punctured; mesopleura with strong punctures.
(Black; usually with a yellow line on the pronotum before the yellow tegulae; legs red, with the coxae and trochanters black, the hind femora black apically, and the hind tibiae and tarsi black, with a white band on the hind tibiae; the fore legs are usually marked with yellow and the



FIGS. 35–36.—Ventral view of the 5th abdominal segment showing the epipleura: 35. *Pimpla flavicoxis* Thoms. ♂; 36. *P. melanacrias* nom. n. ♂.

tegulae are also usually yellow. Cheeks measured along the genal line barely $\frac{2}{3}$ as long as the breadth of the base of the mandible; epipleura of the abdomen narrow, of the 3rd segment about 3 times as long as broad) *turionellae* (L.) (*nec* auctt.).



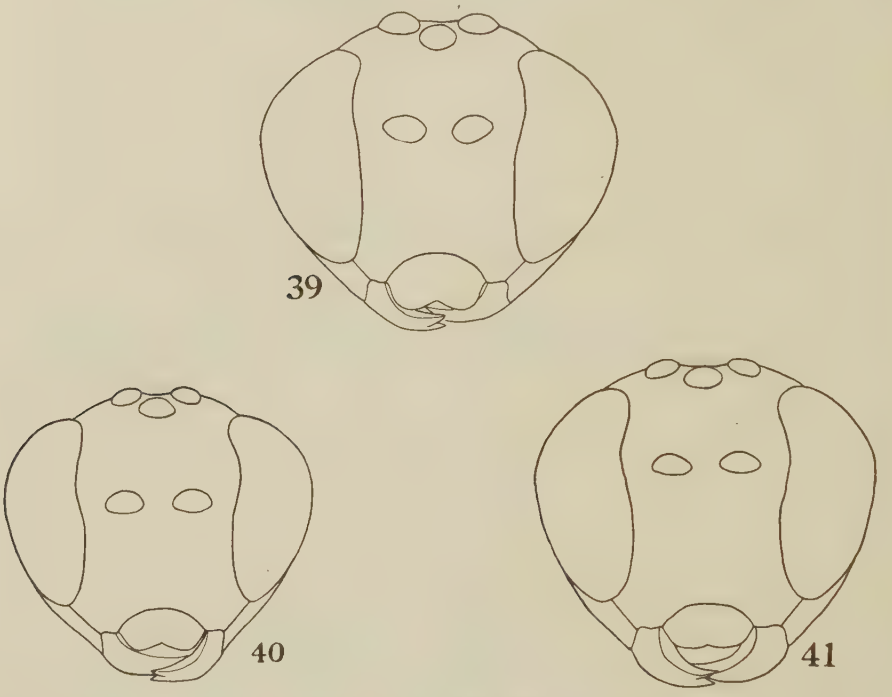
FIGS. 37–38.—Ventral view of the 2nd and 3rd abdominal segments showing the epipleura: 37. *Pimpla melanacrias* nom. n. ♂; 38. *P. contemplator* Müll. ♂.

–. POL : OOL = at most 1·5 : 1; mesonotum with fine, very shallow punctures . . . . . 6.

6. Epipleura of the abdominal segments conspicuously narrower (of the 5th segment about 3 times as long as broad, fig. 35); the areas between the punctures, of at least the first three abdominal segments, distinctly sculptured, the abdomen dull; at least the fore and middle coxae red; cheek measured along the genal line at most $\frac{2}{3}$ as long as the breadth of the base of the mandible (fig. 39).
(Black, the legs red with the hind tibiae and tarsi black, the tibiae with a white or whitish band, the hind femora infuscate at the apex, and the hind

coxae frequently marked with black, rarely entirely black; the scape usually with a yellow spot beneath; the tegulae usually yellow; the scutellum frequently with a yellow spot; usually a small yellow spot before the tegulae) . . . . . *flavicoxis* Thomson.

–. Epipleura of the abdominal segments broad (of the 5th at the most twice as long as broad (*cf.* fig. 36)); the area between the punctures of the basal abdominal segments shining; all the coxae black (very rarely the hind coxae somewhat reddish marked) . . . . . 7.



Figs. 39–41.—Head viewed from in front: 39. *Pimpla flavicoxis* Thoms. ♂; 40. *P. spuria* Grav. ♂; 41. *P. contemplator* Müll. ♂.

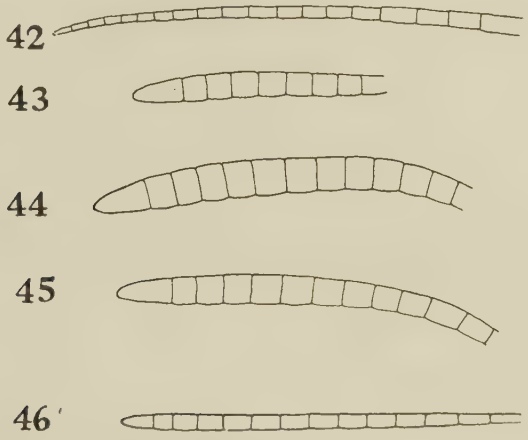
7. Epipleura of the 2nd abdominal segments very narrow, only visible as a narrow strip (fig. 37), the remainder broad; hind femora conspicuously black apically.
(Black, the tegulae very rarely testaceous or yellow, legs red with the coxae and the trochanters black and the hind femora conspicuously black apically, the hind tibiae black with a white ring and the hind tarsi black) *melanacrias* nom. n.

–. Epipleura of the 2nd abdominal segment very broad (about twice as long as broad (*cf.* fig. 38)) as in the remaining segments; hind femora rarely somewhat infuscate at the apex . . . . . 8.

8. Cheek measured along the genal line as long as the breadth of the base of the mandible (fig. 40); 6th tergite with strong clear punctures at least in basal half; abdomen with the punctures deep, clear, the outline sharp.
(Black, the tegulae very rarely testaceous or yellow, the fore and middle legs red with the coxae and trochanters black, hind legs black with the femora entirely red, or at most very narrowly fuscous at the very extreme apex, the tibiae with a white ring; the middle tibiae sometimes with a pale ring) . . . . . *spuria* Grav.

–. Cheek measured along the genal line about ¾ as long as the breadth of the base of the mandible (fig. 41); 6th tergite at most with distinct punctures at the extreme base; abdomen with the punctures shallow and of more indefinite outline.
(Black, tegulae occasionally testaceous or yellow, fore and middle legs red with the coxae and trochanters black, and the middle tibiae usually with a pale ring, hind legs black with the coxae occasionally reddish beneath, the hind femora red with at the most a narrow fuscous apical mark, the hind tibiae with a white ring) *contemplator* (Müll.) (syn. *turionellae* auctt. (*nec* L.)).

Note :—There is a variety that occurs in nearly all the above species of *Pimpla*, in which the apices of the abdominal segments are more or less red. The species in which this form has not yet been observed are *Pimpla sodalis* Ruthe and *P. arctica* Zett.



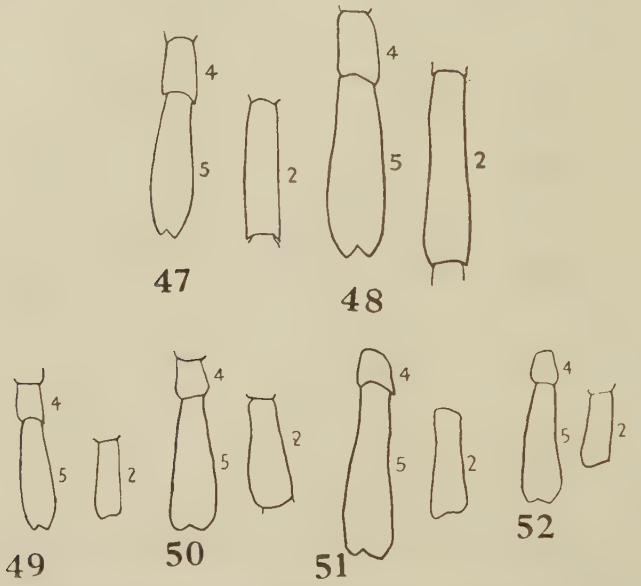
Figs. 42–46.—Apical segments of the antennae: 42. *Pimpla instigator* F. ♂; 43. *Itoplectis alternans* Grav. ♂; 44. *I. clavicornis* Thoms. ♂; 45. *I. clavicornis* Thoms. ♀; 46. *I. maculator* F. ♂.

Keys to the species of *Itoplectis*.

Females.

1. Ovipositor sheaths hardly as long as the first abdominal segment. (Prepectus not strongly excavate behind the front coxae) . . . . . 2.
–. Ovipositor sheaths distinctly longer than the first abdominal segment . . 3.
2. Apical segments of flagellum elongate; fore claws with no basal lobe (fig. 14).
(Black; flagellum yellow or red beneath; tegulae and a spot before them, yellow; legs red, the fore coxae black, the hind tibiae marked with fuscous (or black) and with a white ring, the hind tarsi fuscous or black with the segments white basally; stigma black) . . . . . *curticauda* (Kriech.).
–. Apical segments of flagellum quadrate or transverse, except the ultimate segment which is elongate (fig. 45); fore claws with a basal lobe (fig. 13).
(Black; flagellum yellow beneath; tegulae with a spot before them, yellow; legs red, the coxae sometimes marked with black, the fore and middle legs usually marked with yellow, the hind tibiae black with a broad white ring, the hind tarsi black with the segments broadly white basally; stigma black) . . . . . *clavicornis* (Thomson).

3. Fore claws with no basal lobe (fig. 14); abdomen and legs entirely bright red except for the black fore coxae; 5th hind tarsal segment more than 4 times as long as preceding segment (fig. 51); prepectus not excavate behind the front coxae.
   (Red; only the head and thorax, the antennae in part and the fore coxae black; (In some continental forms the propodeum is entirely, or in part, red) stigma black) . . . . . *melanocephala* (Grav.).
–. Fore claws with a basal lobe (fig. 15); abdomen always black marked or entirely black, and at least the hind tibiae are marked with black and white, and the hind tarsi are black with the base of the segments white; last hind tarsal segment at most $3\frac{1}{4}$ times as long as the preceding segment; prepectus strongly excavate behind the front coxae (*cf.* fig. 1) . . . 4.



FIGS. 47–52.—The 4th and 5th hind tarsal segments compared with the 2nd: 47. *Pimpla turionellae* L. ♂; 48. *P. turionellae* L. ♀; 49. *Itoplectis maculator* F. ♂; 50. *I. maculator* F. ♀; 51. *I. melanocephala* Grav. ♀; 52. *I. alternans* Grav. ♀.

4. Thorax strongly punctured and covered with long grey or brown hair; hind trochanters always for the most part black; 5th hind tarsal segment less elongate (fig. 50).
   (Black; flagellum yellow beneath, the scape sometimes marked with yellow; tegulae and a spot before them, yellow; legs red, the coxae and trochanters black, the fore coxae and the trochanters sometimes marked with yellow, the fore legs frequently yellow marked, the middle and hind tibiae red and fuscous or red and black, with a white ring, middle and hind tarsi black, the segments white basally; abdomen with the segments laterally and apically red; stigma black, rarely fuscous) . . . *maculator* (Fab.).
–. Thorax indistinctly punctured, and with short hair except on the propodeum; hind trochanters always red; 5th hind tarsal segment more elongate (fig. 52).
   (Black; flagellum yellow or red beneath; tegulae and a spot before them usually yellow; legs red, the coxae frequently black or marked with black, the middle tibiae usually marked with fuscous and with a white spot to-

wards the base, the hind tibiae black, conspicuously marked with red and with a white ring (very rarely black with a white ring), the middle and hind tarsi black or fuscous with the segments white basally, the fore legs sometimes marked with yellow; the abdominal segments rarely marked with red apically; stigma pale, margined with black, varying to entirely black (var. *kolthoffi* Auriv.)) . . . . . *alternans* (Grav.).

Males.

1. The 12 apical segments of the flagellum forming a club, the central and distal segments of which are broader than long except the apical segment which is elongate (fig. 44).
   (Hind trochanters red; hind tibiae black with a white band; fore and middle legs usually entirely yellow; hind coxae black; stigma pale. Prepectus not strongly excavate behind the front coxae) *clavicornis* (Thomson).
–. The 12 apical segments of the flagellum elongate, occasionally two or three of these segments quadrate, but never transverse (*cf.* figs. 43–46) . . . . 2.
2. Legs red, abdomen red with the genital claspers black. Abdominal segments 3–6 with distinct tubercles, 2 with distinct impressions.
   (Mesonotum, mesopleura and propodeum rather strongly punctured; propodeum sometimes red, or red marked; stigma dark; 5th hind tarsal segment about five times as long as the preceding segment; prepectus not strongly excavate behind the front coxae) . . . *melanocephala* (Grav.).
–. At least the hind tibiae tricoloured (black or fuscous, white and red), sometimes or in some varieties black and white; hind tarsal segments black, white basally; abdominal tubercles not conspicuously developed; 5th hind tarsal segment at most 4 times as long as the preceding segment . . 3.
3. Hind coxae red; hind tibiae but little fuscous marked; prepectus not excavate behind the front coxae.
   (Sculpture similar to that of *I. alternans* Grav. Usually a large species) *curticauda* (Kriechb.).
–. Hind coxae black; hind tibiae usually with conspicuous fuscous markings; prepectus strongly excised behind the front coxae . . . . . 4.
4. Middle and hind trochanters black; apical antennal segments more elongate (fig. 46); 5th hind tarsal segment less elongate, about three times as long as the preceding segment.
   (Mesonotum and mesopleura with strong punctures; hair on the thorax long; stigma always dark) . . . . . *maculator* (Fab.).
–. All the trochanters yellow or red; apical antennal segments less elongate (fig. 43); 5th hind tarsal segment more elongate, about 4 times as long as the preceding segment.
   (Mesonotum distinctly though weakly punctured, mesopleura almost without punctures; fore and middle coxae yellow, sometimes marked with black or entirely black; stigma centrally pale or dark, entirely black in var. *kolthoffi* Auriv.) . . . . . *alternans* (Grav.).

Keys to the species of *Apechthis*.

Females.

1. All the claws with basal lobes (*cf.* fig. 14). . . . . 2.
–. Only the claws of the fore and middle legs with basal lobes, the hind claws simple (*cf.* fig. 13).
   (Legs red, the hind tibiae sometimes infuscate but always with a white band, hind tarsi fuscous; pronotum with a yellow line in the hinder angle;

internal orbits, scutellum and post-scutellum apically, usually distinctly marked with yellow; mesonotum black; ovipositor shorter) *resinator* (Thunberg).

2. Hair on the propodeum dark brown or black; hind tibiae without a distinct pale band towards the base; keels of the first abdominal segment forming two distinct tubercles.
(Legs entirely red, the hind tibiae only very narrowly fuscous at the extreme base, the extreme apex hardly darkened; face with the internal orbits usually somewhat marked with yellow; hind angles of the pronotum usually with a yellow or red spot; mesonotum black; the scutellum and post-scutellum apically usually inconspicuously marked with yellow) *compunctor* (L.).

–. Hair on the propodeum white; the hind tibiae with a distinct pale band towards the base; the keels of the first segment not forming such distinct central tubercles.
(Legs red with the hind tibiae usually infuscate with a pale band towards the base and the hind tarsi infuscate; pronotum with a yellow line in the hind angles; mesonotum usually with two yellow lines on the anterior margin, and with two yellow spots or lines before the scutellar fovea, and the two lines may extend to and join the two anterior stripes; the callus of the mesopleura sometimes with a yellow mark; scutellum yellow apically, post-scutellum entirely yellow) . . . . . *rufata* (Gmelin).

Males.

1. Hair on the propodeum white; hind tibiae with a pale band; 1st tergite with the keels only weakly raised.
(Face usually entirely yellow; pronotum, mesonotum, mesopleura and mesosternum, scutellum and post-scutellum usually strongly marked with yellow; legs red, marked with yellow, with the coxae sometimes marked with black basally, the hind tibiae usually infuscate, and with a white band, and the hind tarsal joints infuscate at least apically) . . . . . 2.

–. Hair on the propodeum brown or black; hind tibiae entirely red, sometimes narrowly darkened at the extreme base and apex. 1st tergite with the keels rather strongly raised.
(Face yellow, usually with a central black spot; 7th tergite with fine sculpture between the punctures, somewhat dull; mesonotum, scutellum and post-scutellum marked with yellow; legs red, with the fore and middle coxae sometimes marked with yellow, and the fore and hind coxae sometimes black basally) . . . . . *compunctor* (L.).

2. 6th and 7th tergites closely and more strongly punctured, with distinct though very fine sculpture between the punctures; duller . *rufata* (Gmelin).

–. 6th tergite sparsely punctured apically, the 7th closely punctured only in the basal third, with very inconspicuous sculpture between the punctures, and apically smooth and strongly shining . . . . *resinator* (Thunberg).

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NOTE :—The references to the original descriptions may be found by consulting Dalla Torre (1901), Morley (1907) and Schmiedeknecht (1906 and 1934–35).